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THE FUTURE OF UTAH COPPER

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Long a mainstay of the Utah economy, the decline and subsequent closing of the Bingham Mine complex of Kennecott Copper Corporation was a depressing epitaph to the prosperous 1970s. The state's best economic news of 1986 was the mine's reopening, even though at a reduced scale of employment. But with the mining industry depressed nationwide, the question of Bingham's survival--not only whether, but at what scale--is an open one. In this paper the state of the world and U.S. copper industries are examined and, within that perspective, a favorable outlook is predicted for the copper industry in Utah.

Copper Production and Technology

To understand the economics of copper, it is necessary to understand something of its production as well as its uses. Most of the copper used daily in plumbing and electric wiring, automobiles, aircraft, appliances and computers, has gone through four basic processes--mining, concentrating, smelting and refining--before being manufactured into useful products.

Mining--Ore extraction is accomplished through either of two basic mining techniques. The "open pit" approach involves removing the overburden of non-copper bearing rock to expose the copper ore, that is then blasted and removed for processing. Using the more traditional "underground" approach, workers tunnel underground and harvest ore veins, transporting the ore to the surface by the use of conveyors or hoists.

Ore mined in the Western United States is primarily porphry ore which in its generic sense means that the size of the ore deposit is large, but has a copper content or ore grade of 1 percent or less. Ore bodies in the Mountain States vary between .4 and .8 percent.

Concentrating and Smelting--After it is mined, the ore is crushed and ground into powder and then concentrated, usually through a flotation process, into a composition containing 10 to 40 percent copper. In this concentrated form, the copper is then melted in furnaces and the resulting matte is poured into converters where, through

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oxidation, the sulfur and other impurities are removed. This melting and converting treatment, known as smelting, renders blister copper which is 99.5 to 99.8 percent pure copper.

Refining--Despite that degree of purity, the production of commercial copper requires one more step. Refining the blister copper to 99.99 percent purity is accomplished through an electro-chemical process, wherein copper is dissolved from anodes and plated onto cathodes while in a chemical bath. Once the copper has been refined and cast into its various shapes, it is ready for sale to buyers and manufacturers.

New Production Process

This basic four-step production process has been modified in some instances through recent advances in technology. Solvent extraction and electrowinning (SXEW) is a leaching process that cost effectively extracts and processes copper. In this continuous process, a copper liquor is leached from ore piles by chemical action into mixing/settling tanks where copper is extracted and sent to a stripping section. Mixed with a reagent, the copper is stripped of most impurities and is sent directly to electrowinning cells. After processing through these cells, a final saleable product of 99.95 percent pure

Table 1

World Refined Consumption
(thousands of metric tons)

Country	1951	1961	1971	1981	1982	1983	1984	1985
United States	1,251.4	1,348.1	1,833.4	2,209.5	1,664.2	1,775.4	2,122.7	1,905.6
U.S.S.R.*	330.0	681.8	985.0	1,320.0	1,320.0	1,320.1	1,280.0	1,305.0
Japan	91.5	372.9	805.7	1,254.1	1,243.0	1,216.8	1,368.3	1,230.8
Germany	189.2	561.9	630.5	747.5	730.8	737.0	791.7	753.8
France	141.2	243.6	343.6	429.6	419.0	390.0	411.5	397.8
Italy	81.0	202.0	270.0	366.0	342.0	325.0	348.0	362.0
United Kingdom	335.7	528.8	517.3	333.1	355.4	358.0	352.9	346.5
Belgium	72.3	74.5	147.0	260.0	277.1	258.2	299.3	309.6
Canada	123.1	128.6	220.4	241.6	158.6	195.0	231.8	222.5
South Korea	--	--	8.7	144.0	131.9	152.3	188.0	207.3
Brazil	21.8	36.4	93.5	179.0	249.3	148.4	189.4	196.1
Yugoslavia	19.3	41.3	74.5	148.6	144.1	134.0	148.0	157.1
Australia	37.9	59.4	110.4	142.6	131.4	127.2	116.0	123.7
Mexico	12.4	19.6	60.0	131.0	87.5	86.1	87.3	117.5
Spain	16.0	54.6	106.7	107.0	120.3	122.5	113.6	115.7
Sweden	55.9	93.5	91.4	106.4	107.7	113.0	116.2	110.3
Chile	46.6	12.3	26.7	39.0	32.8	24.3	35.3	25.7
Zaire	--	--	1.3	1.4	2.9	1.8	3.3	2.7
Zambia	--	--	1.4	2.2	2.8	1.1	--	--
World Total	3,077.7	5,080.7	7,327.0	9,524.5	9,046.7	9,107.2	9,944.1	9,650.6

Source: World Metal Statistics. Published by World Bureau of Metal Statistics (London, England, December 1986).

*While the U.S.S.R. is the second largest consumer of copper, its impact on the Free World economy is minimal in terms of exports/imports.

cathode copper results. The SXEW methodology can produce cathode copper for as low as 45 cents per pound while conventional processing hovers in an average range of 50 to 80 cents a pound.

The benefits of the SXEW process, in terms of labor and handling costs, are obvious and significant, where it is applicable. However, at present, the combination of solvent extraction and electrowinning is only usable on a small portion of U.S. deposits with estimates listing 20 percent of domestic ore as being amenable to the leaching process. Also, SXEW only recovers 50 percent of the ore's copper content and does not allow for the recovery of copper by-products such as gold and silver, that are often also contained in and harvested from copper ore.

Regardless of the process used to obtain it, copper--as a metal--has unique characteristics that lend it to certain applications where other metals have failed. Because of its flexibility and electrical conductivity, it is considered a strategic metal and has historically been used for many purposes including building and construction, electrical appliances, electronic applications, industrial equipment and transportation products with 60 percent of overall copper demand coming from electrical applications.

The World Demand and Supply for Copper

Historically, world demand for the red metal has persistently increased, with a high as recently as 1984 of 9,944,100 metric tons consumed (Table 1). The United States has been and remains the leading consumer of copper with Japan rising to second place

Table 2

World Mine Production
(thousands of metric tons)

Country	1951	1961	1971	1981	1982	1983	1984	1985
Chile	380.7	547.4	708.3	1,081.1	1,242.2	1,257.5	1,290.7	1,356.4
United States	842.2	1,057.1	1,380.9	1,538.2	1,147.0	1,038.1	1,102.6	1,105.8
U.S.S.R.*	254.0	550.0	990.0	1,000.0	1,010.0	1,020.0	1,020.0	1,030.0
Canada	244.9	398.3	654.5	691.3	612.5	653.0	721.8	730.3
Zambia	319.4	574.7	651.4	587.4	529.6	591.3	576.0	519.6
Zaire	192.0	295.2	405.8	504.8	502.8	502.2	500.7	502.1
Peru	32.0	198.1	207.4	327.6	356.3	322.2	364.7	384.6
Australia	16.9	97.2	177.3	231.3	245.3	261.5	236.0	261.2
Philippines	12.7	51.9	197.4	302.3	292.2	271.4	233.6	226.1
South Africa	33.7	54.3	148.4	210.6	207.1	211.8	212.0	203.9
Mexico	--	--	--	230.5	239.1	206.1	180.0	178.9
Papua, New Guinea	--	--	--	165.4	170.0	183.2	164.4	175.0
Yugoslavia	--	--	--	111.0	119.3	129.5	137.6	142.5
World Total	333.90	572.00	920.3	1,176.4	1,368.9	1,464.7	1,544.6	1,602.0

Source: World Metal Statistics. Published by World Bureau of Metal Statistics (London, England, December, 1986).

*While the U.S.S.R. is the third largest consumer of copper, its impact on the Free World economy is minimal in terms of exports/imports.

in recent years. Consumption in both countries appears to be leveling off, and appears fairly stagnant at a level of world consumption between 10 million and 11 million short tons. Involved has been the slowing of population growth in the developed countries, the stagnation of economic growth rates worldwide, the retarded rise of real incomes and the emergence of competitive materials such as PVC and fibre optics. A more subtle but pervasive cause has been the changing nature of economic output. As America continues to evolve into a service economy, the demand for copper tapers to match the reduction in manufacturers requiring copper. The downsizing of cars decreased the size and demand for copper components as well, while advances in telecommunications have lessened the intensity of copper use by increasing the capacities of current copper communication cables. These events have all served to reduce the future demand.

While the threat of substitution is always real, the figures in Table 1 show that demand has been fairly stable in the last seven years with the exception of the dip during the 1982 recession. In fact, the high 1984 figure indicates that substitution is not a major contributor to any decline in demand for copper production, though it has undoubtedly been a factor in restraining consumption growth, which has remained stable in absolute terms rather than growing at the same rate as the economy. Most substitutes for copper are not total replacements. Aluminum, for example, can be substituted

Table 3

World Smelter Production
(thousands of metric tons)

Country	1951	1961	1971	1981	1982	1983	1984	1985
United States	976.7	1,166.4	1,421.0	1,377.6	1,020.8	987.0	1,183.4	1,193.3
U.S.S.R.*	254.0	550.0	990.0	1,250.0	1,130.0	1,120.0	1,120.0	1,140.0
Chile	360.1	524.8	625.1	953.8	1,046.8	1,058.9	1,098.3	1,088.5
Japan	43.8	289.7	661.2	980.1	1,046.3	1,061.9	929.0	932.6
Zambia	316.0	575.6	643.7	571.6	580.7	562.7	531.9	544.2
Canada	220.4	364.3	462.3	479.0	412.4	406.4	440.0	480.0
Zaire	186.0	294.1	404.6	468.2	466.4	465.5	465.5	469.4
Peru	24.3	179.8	166.4	302.3	323.2	295.9	331.1	354.0
Germany	52.5	94.2	161.5	251.4	240.0	253.6	225.0	180.0
Australia	16.9	65.5	149.8	177.2	180.3	181.8	188.0	174.6
South Africa	33.1	53.1	152.3	185.4	191.8	192.3	180.8	168.4
Yugoslavia	--	--	--	102.4	106.0	119.3	126.1	127.8
Spain	--	--	--	107.9	135.0	118.0	127.2	120.5
United Kingdom	--	--	--	108.2	119.4	124.0	100.2	112.7
Other	220.0	434.5	863.9	1,107.2	1,315.0	1,415.3	1,574.3	1,784.2
World Totals	2,703.8	4,592.0	6,701.8	8,422.3	8,314.1	8,362.6	8,620.8	8,870.2

Source: World Metal Statistics. Published by World Bureau of Metal Statistics (London, England, December, 1986).

*While the U.S.S.R. is the second largest producer, its impact on the Free World economy is minimal in terms of exports/imports.

for copper in residential electrical wiring, but copper does not have the inherent problems that aluminum has in terms of reliability. Also, PVC as a substitute for copper in plumbing is increasing in usage. Copper's ability to withstand extremes of hot and cold when compared to PVC, however, again leaves copper the material of choice. It has been predicted that substitutions for copper will increase significantly in the next decade.

Rebounding from the recessionary lows of the early 1980s, U.S. copper consumption appears to be on the rise again with 1984 figures nearing past five-year cyclical highs. In contrast to its consumption rate, however, 1984 domestic production only filled about 75 percent of U.S. refined copper requirements. While the U.S. demand made up 21 percent of world consumption, it contributed only 16 percent of the world's refined production. Since 1982, American production figures have dipped so low that the U.S. dropped to second place behind Chile in total mine production (Table 2), though it remains at the forefront in refining. The U.S. fell behind Chile in smelting during the 1982-1983 recession, but regained its lead by a narrow margin thereafter (Table 3). Note: United States preeminence in coppr refining remains unchallenged among free world nations despite the Japanese advance (Table 4).

Table 4

World Refining Production
(thousands of metric tons)

Country	1951	1961	1971	1981	1982	1983	1984	1985
United States	1,217.9	1,645.5	1,780.3	1,996.1	1,682.6	1,581.5	1,489.5	1,436.3
U.S.S.R.*	325.0	660.0	1,158.0	1,320.0	1,350.0	1,400.0	1,380.0	1,400.0
Japan	90.0	277.0	713.3	1,050.1	1,075.0	1,091.9	935.2	936.0
Chile	318.8	226.3	398.5	775.6	852.5	834.2	879.7	884.3
Zambia	104.8	418.9	534.3	564.0	587.0	573.5	521.9	510.0
Canada	222.7	368.6	477.5	476.7	337.8	464.3	504.3	499.6
Germany	205.3	314.9	400.1	387.4	393.6	420.3	378.8	414.4
Belgium	142.1	202.8	312.8	428.5	457.8	404.5	396.3	412.6
Peru	22.8	33.8	32.6	200.4	224.5	194.7	219.0	226.8
Zaire	106.9	150.9	207.8	151.3	175.0	226.9	225.2	226.8
Spain	14.4	44.2	79.3	152.1	171.9	158.6	156.4	151.7
South Korea	--	1.4	6.8	113.0	115.8	134.8	140.6	151.6
South Africa	12.3	17.2	79.2	144.8	142.5	157.7	148.4	145.5
United Kingdom	209.2	226.0	177.6	136.2	134.1	144.4	136.8	125.4
World Total	3,204.9	5,124.3	7,334.3	9,558.7	9,418.5	9,671.3	9,544.6	9,713.7

Source: World Metal Statistics. Published by World Bureau of Metal Statistics (London, England, December, 1986).

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Table 5

World Copper Capacity and Production, 1973 and 1983
(thousands of short tons)

	Mine				Smelter				Refinery[a]			
	Capacity		Production		Capacity		Production		Capacity		Product	
	1973	1983	1973	1983	1973	1983	1973	1983	1973	1983	1973	1983
North America:												
Canada	1,000	675	899	625	640	700	546	385	610	675	548	544
U.S.	2,000	1,780	1,718	1,038	2,000[2]	1,884	1,744[3]	987	2,910	2,822	1,868	1,584
Other	100	355	97	251	100	170	81	75	80	145	58	75
Total	3,100	2,810	2,714	1,914	2,740	2,754	2,371	1,447	3,600	3,642	2,474	2,202
South America:												
Chile	900	1,290	819	1,257	900	1,120	650	1,058	660	900	457	833
Peru	270	430	241	322	220	400	148	258	50	250	43	191
Other	30	40	18	24	10	70	5	10	40	110	32	57
Total	1,200	1,760	1,078	1,603	1,130	1,590	803	1,326	750	1,260	532	1,081
Europe:												
USSR	800	1,880	772	1,511	830	2,200	772	1,746	800	2,116	733	1,826
Other	640	1,420	611	324	1,070	1,000	991	720	1,800	1,560	1,748	1,505
Total	1,440	3,300	1,383	1,835	1,900	3,200	1,763	2,466	2,600	3,676	2,481	3,331
Africa:												
Zaire	550	600	538	535	530	500	508	467	270	250	246	227
Zambia	870	800	779	563	840	630	759	581	770	800	704	575
Other	360	340	318	321	290	330	262	299	140	190	134	173
Total	1,780	1,740	1,635	1,419	1,660	1,460	1,529	1,347	1,180	1,240	1,084	975
Asia total:	680	430[b]	604	319[b]	1,300	320[b]	1,287	228[b]	1,340	320[b]	1,244	302[b]
Oceania total:	490	460	443	439	220	190	179	180	200	210	159	199
Other total:	0	220	0	571	0	2,000	0	1,348	0	1,610	0	1,354
World Total	8,690	10,290	7,857	8,100	8,950	11,514	7,932	8,342	9,670	11,948	7,974	9,444

[a]Capacity for many plants includes capacity for processing scrap; tabulated production, to the extent possible, for primary materials only.
[b]Figures represent approximate 1983 Asia totals.

Source: Bureau of Mines, Mineral Facts and Problems, 1985 ed. (Washington, D.C., Superintendent of Documents).

The static nature of copper consumption contrasts sharply with what has been happening to worldwide production potential, particularly with the expansion of capacity in South Africa and Chile and the emergence of Zaire and Zambia as copper producers. Tables 2, 3 and 4 indicate production developments at the mining, smelting and refining levels since 1951. However, production is constrained by demand. Table 5 compares copper mining production to capacity in 1973 and 1983. With capacity exceeding demand by over 20 percent in 1983, either of two results were almost inevitable. Either a cartel of nations would emerge to control output and maintain prices or copper prices would be driven to the costs of production of the marginal producer. The difficulties the Organization of Petroleum Exporting Countries (OPEC) has had in enforcing its production quotas illustrates the greater likelihood of the latter. Shares in the world demand are then allocated by market forces according to the proportion of each nation's capacity to meet that world market price or by political forces to the degree each nation's taxpayers or consumers are prepared to subsidize their domestic copper industry.

U.S. Competitiveness

The U.S. was king in the copper industry until the early 1980s. It attained that position not only by being the world's largest consumer and domestic producer but also by U.S. companies developing much of the rest of the world's copper resources. Abdication was forced from the production side by the nationalization policies of South American and African nations during the late 1960s and early 1970s. Chile's nationalization was most disruptive to the U.S. industry because of the size of the operations expropriated and because of that nation's failure to fairly compensate the corporations involved. Three companies owned by American interests (two by Anaconda and one by Kennecott) accounted for 85 to 90 percent of Chilean copper production from 1920 to 1970. But as Chileans increasingly perceived their mineral resources as being taken from their country without benefit to their people, steps were first taken to increase taxes on copper exports by foreign-owned firms. These taxes began at approximately 1 percent of value in 1922 and increased to Kennecott's high in 1965 of 84.4 percent of value.

But such gains from taxes and from eventual part ownership in the U.S.-funded, Chilean-based operations were still not sufficient to satisfy political appetites. With the inauguration of President Salvadore Allende, the threat of full-fledged nationalization in the industry became a reality. Chile sent Anaconda and Kennecott packing and determined that neither company was due any remuneration for its confiscated operations. The costly nature of these take-overs for the American companies becomes quickly apparent when one considers that the El Teniente property of Kennecott's subsidiary, the Braden Company, which was and is the world's largest underground copper producing mine, reaped profits sufficient to be the primary cause of Kennecott's 23 percent increase in net income, from $102,022,000 in 1965 to $125,375,000 in 1966. Also, it should be noted that Anaconda's confiscated Chuquicamata mine was and is the world's largest open pit mine.

Although financial losses incurred by Kennecott and Anaconda in the Chilean nationalization were sizeable despite eventual compensation won through lawsuits, the economic impact of nationalization was by no means the major cause of the U.S. competitive decline. Such factors as wages, productivity, ore quality, funding and pricing along with government regulations all have taken their toll on the health of the domestic copper industry. To Latin American output was added African production, which began in European colonies and continued to be financed by Europeans, even after the Belgian Congo became the independent nations of Zambia and Zaire. Thus, the U.S. has as its main competitor, Chile in free world mining, with Japan and Chile posing the main threats in free world smelting and refining.

During 1985-86, world copper prices vacillated between 58 and 64 cents per pound. But copper futures have trended persistently toward the 57 to 60 cents per pound range which represents the current cost of production in Zaire, Zambia and Chile. This is unnerving to U.S. domestic producers whose average 1985 cost of production was 71 cents per pound, down from $1.10 per pound in 1983 (Table 6).

U.S. copper producers suffer in world competition because of wage rates, ore type and quality and public policy. Data do not seem to be available on

the wage rates of Chile, Zaire and Zambia but they are certain to be a small fraction of the U.S. copper industry's $12.53 average hourly wage of 1982. What makes U.S. competition possible is that, whereas the U.S. industry stresses mechanization, the three lowest wage competitors are government-owned enterprises under considerable political pressure to maintain employment. Labor intensive methods are preferred to maximize employment. Low productivity in these nations makes it possible for a high wage nation to trade greater productivity for lower unit costs.

While pre-by-product credit production costs may vary due to mining method and ore composition, the fact that South Africa's and Zaire's gross production costs are significantly higher (Table 6) than either the U.S. or Chile, indicates an overall lower productivity in these two more labor intensive producers. The comparatively large by-product credits that these countries enjoy, however, made them competitive producers.

As the oldest of copper producers, the highest quality U.S. deposits have been worked out. U.S. ore feed grades currently average 0.65 percent, while Chile's average 1.02 percent and Zambia's 3.93 percent (Table 7). Ore grades in some African mines have been reported as high as 6 percent. While the ore grade is important, the stripping ratio -- the tonnage of overburden removal necessary to remove one ton of copper ore--also has a bearing on the profitability of extraction.

A related issue here is the depletion of copper resources. It is predicted that both U.S. and Zambian capacities will face significant decline over the next decade with capacities expected to drop to 1.05 million tons per year and 440,000 tons per year respectively by 1995. The effects of those declines are magnified by the sizeable increases in capacity expected in Latin America as a whole and Chile in particular.

Table 6

Estimated Production Costs at Producing Copper Mines
(January 1985 U.S. dollars per pound of refined copper)

Country	Number of Mines	Mine Operating Cost	Mill Operating Cost	Smelter/ Refinery Cost[a]	(Less) By-product Credit	Net Operating Cost	Taxes[b]	Cash Cost	Recovery of Capital	Production Cost
Australia	3	$.19	$.10	$.32	$.07	$.54	$.01	$.55	$.08	$.63
Canada	14	.27	.35	.45	.32	.75	.01	.74	.12	.86
Chile	9	.30	.17	.11	.05	.53	.02	.55	.05	.60
India	5	.34	.21	.42	.03	.94	.05	.99	.12	1.11
Peru	6	.19	.20	.32	.05	.66	.02	.68	.14	.82
Philippines	7	.31	.27	.22	.21	.59	.05	.64	.07	.71
Rep. of South Africa	4	.41	.25	.50	.49	.67	.00	.67	.13	.80
United States	13	.23	.20	.23	.09	.57	.02	.59	.12	.71
Zaire	7	.39	.19	.25	.41	.42	.08	.50	.07	.57
Zambia	8	.31	.14	.05	.09	.41	.06	.47	.12	.59
Other	34	.25	.27	.29	.30	.51	.05	.56	.10	.66
Total or Average	110	.28	.21	.22	.16	.55	.03	.58	.09	.67

[a]Includes cost of transportation. [b]Taxes and production cost are at a zero rate of return.

Source: U.S. Bureau of Mines Minerals Availability System (MAS) cost analysis.

Table 7

Average Ore Feed Grade and Recoverable Copper from Producing and Nonproducing Copper Deposits in the Reserve Base, by Region and Country (based on January 1985 resource estimates)

Region & Country	Number of Deposits	Producing		Nonproducing		Total	
		Average Feed Grade (%)	Recoverable Copper (million metric ton)	Average Feed Grade (%)	Recoverable Copper (million metric ton)	Average Feed Grade (%)	Recoverable Copper (million metric ton)
U.S.	62	.65	27.4	.60	30.0	62	57.4
Chile	16	1.02	85.3	1.04	26.9	1.03	112.2
Zambia	9	2.31	10.0	W	W	W	W
Zaire	8	3.93	17.8	W	W	W	W

W=Withheld to avoid disclosing individual deposit data.

Source: U.S. Bureau of Mines, Minerals Availability System (MAS).

Both U.S. and foreign government policies work against U.S. competitiveness. U.S. producers complain that the International Monetary Fund and other international agencies undermine U.S. competitiveness by giving Third World producers access to expansion funds at below market interest rates.

They also complain of foreign copper being subsidized in the world market. The latter charge is more problematical. The term implies pricing a product at profitable levels in the domestic market and below cost in foreign markets to maintain high output levels. However, none of the third world copper producers have any significant domestic demand for their copper. It is almost entirely an export product. For any producer with excess capacity it makes economic sense to sell below full costs, as long as variable costs are covered, so as to make some contribution toward fixed costs which continue regardless of production levels.

The attractive credit availability, however, may well have been an encouragement for expansion which then led to overcapacity and served as a catalyst for the variable cost pricing. Especially after 1983, many Third World countries found themselves heavily in debt and faced with increasing interest rates and decreasing copper prices. To deal with a growing debt servicing crisis, many late developing countries substantially devalued their currencies, restructured economic management policies and tried to overcome the significant decline in economic growth apparent in the early 1980s.

Some countries found their efforts effective in bringing some modicum of stability to their economies. African and Latin American countries, such as Zambia, Zaire and Chile, however, were not so lucky. Due to numerous and sizeable loans, insufficient adjustment of government and economic policies and an over-reliance on profits generated by commodity exports, such countries have been forced to minimize use of imports while maximizing export opportunities. Toward that end, exchange rates were modified to enhance competitive positions in export markets on a national level, while producers focused on increasing operating efficiencies and lowering production costs. Because a number of these countries see copper exports as their main source of the foreign exchange earnings needed for external debt servicing, their production of copper for export sale has increased significantly despite declining external demand for the red metal. This sizeable increase in supply without offsetting demand increases serves to keep the price of copper at historically low levels, impeding the ability of the United States to compete in the copper market.

Table 8
Western States Copper Production by State
(thousands of short tons)

Year	Arizona	Montana	Nevada	New Mexico	Utah	Utah Percent of Total
1946	289,223	58,481	48,616	50,191	114,284	18.7
1947	366,218	57,900	49,603	60,205	266,533	31.4
1948	375,121	58,252	45,242	74,687	227,007	27.1
1949	359,010	56,611	38,058	55,388	197,245	26.2
1950	403,301	54,478	52,569	66,300	278,630	30.6
1951	415,870	57,406	56,474	73,558	271,086	29.2
1952	395,719	61,948	57,537	76,112	282,894	30.5
1953	393,525	77,617	61,850	72,477	269,496	29.0
1954	377,927	59,349	70,217	60,558	211,835	25.3
1955	454,105	81,542	78,925	66,417	232,949	23.3
1956	505,908	96,426	80,824	74,345	250,604	22.6
1957	515,854	91,512	77,750	67,472	237,857	21.8
1958	485,839	90,683	66,137	55,540	189,184	19.3
1959	430,297	65,911	57,375	39,688	144,715	17.5
1960	538,605	91,972	77,485	67,288	218,049	20.1
1961	587,053	104,000	78,022	79,606	213,534	18.3
1962	644,242	94,021	82,602	82,683	218,018	17.7
1963	660,977	79,762	81,738	83,037	203,095	17.0
1964	690,988	103,806	67,272	86,104	199,588	16.0
1965	703,377	115,489	71,332	98,658	259,138	19.1
1966	739,569	128,061	78,720	108,614	265,383	18.5
1967	501,741	65,483	50,771	75,008	168,609	17.6
1968	627,961	69,480	77,213	90,769	228,245	18.9
1969	801,363	103,314	104,294	119,956	296,699	19.2
1970	917,918	120,412	106,688	166,278	295,738	17.1
1971	820,171	88,581	96,928	157,419	263,451	16.9
1972	908,612	123,110	101,119	168,034	259,507	15.5
1973	927,271	132,466	93,702	204,742	256,589	14.9
1974	858,783	131,131	84,101	196,585	230,593	14.4
1975	813,211	87,959	81,210	146,263	177,155	12.5
1976	1,024,421	91,111	58,160	172,360	185,458	11.5
1977	923,778	86,203	67,061	164,698	194,130	12.9
1978	891,404	67,326	20,453	127,828	186,330	12.4
1979	946,002	69,854	W	164,281	193,082	12.1
1980	770,118	37,749	W	149,394	157,775	12.1
1981	1,040,813	62,485	W	154,114	211,276	12.4
1982	769,974	57,086	W	W	189,090	15.1
1983	678,216	33,337	W	W	169,751	14.8
1984	746,453	W	W	W	W	
1985	819,108	15,126	W	W	W	

W - Withheld to avoid disclosing company proprietary data.

Sources: Bureau of Mines Minerals Yearbooks 1948-1984; Bureau of Mines Minerals Yearbook Preprint 1985 (Washington, D.C., Government Printing Office).

The U.S. environmental policies have proved most troublesome to the smelting component of the U.S. copper industry. Although the true economic impact of the Clean Air Act on smelters is hard to determine, many, including Anaconda's Montana smelter and three of four Phelps Dodge smelters, have closed since the enforcement of the requirement for compliance to the Act's National Air Quality Standards. Since the enforcement of the Ambient Air Quality Standards, some U.S. companies have chosen to go the route of the Japanese and endure the expense of installing the European-designed flash furnace, which provides a 98 percent sulfur dioxide recapture rate and serves to bring such smelting operations into compliance.

Loss of production and employment are among the costs which must be compared to the benefits of cleaner air.

Utah in the U.S. Copper Industry

Utah is unique among copper producing states in that the state at one point achieved second rank with only one substantial mine (Table 8). Utah's Bingham Mine is the nation's second largest open pit mining operation with a current production capacity of 230,000 metric tons of copper annually (Table 9), leaving Utah as the third state in copper producing capacity--behind Arizona and New Mexico. Arizona relies upon 19 mines to achieve its production capacity of 943,000 tons. New Mexico has a capacity of 250,000 tons from four mines. The other copper-producing states are Michigan, Montana (once the national leader), Nevada and Tennessee, but no one of these is significant beside the top three.

On a company basis, Kennecott Copper Corporation had 440,000 tons of domestic copper production capacity in Utah, Arizona and New Mexico, until 1986. Second ranked Phelps-Dodge had 360,000 tons in Arizona and New Mexico. Running third was Newmont with a capacity in its Arizona mines of 205,000 tons. All others were substantially smaller. Since the Bingham Mine is Utah's copper industry, it is convenient to trace that mine's history before returning to a discussion of Utah's competitive position vis-a-vis the other states.

History of the Bingham Mine

The giant man-made amphitheater south of Salt Lake City is as rich with history as it is with copper and gold. Copper was originally discovered by the Bingham brothers--two Mormon pioneers after whom the mine was named--but was long ignored for lack of facilities and financial resources to undertake production. Initially, the limited mining that did occur in the canyon was done on a very small scale since transportation of ore was at best difficult. Mining did exist in the Canyon during the 1860s, 1870s and 1880s, but this was the harvesting of Bingham's lead-silver deposits. Copper was also produced in small quantities but only as a by-product of the lead-silver mining efforts.

It was Enos A. Wall who recognized the potential value of the Bingham Canyon copper, having staked claim to over 200 acres of Bingham Canyon. "Colonel" Wall began the assessment work and did some development which he personally financed from monies gained in other mining enterprises. At the same time, Samuel Newhouse, having begun with a gold mining interest, discovered a number of rich copper ore deposits; and he eventually began extracting to an extent which justified his erection of Utah's first copper smelter completed in 1899.

Boston Consolidated Mining Company

The mining of porphry ores with what was then considered to be low ore grades of approximately 2 percent was started by Newhouse and his Boston Consolidated Mining Company. Proposing that such ore could be mined economically by steam shovel mining, Boston Consolidated began stripping the overburden at the mine and shipping ore in 1906. This initial application of the open cut method, however, was short lived. Because the steam shovel operation began running into high iron content ore instead of the more profitable copper-laden ore, the surface mining method became uneconomical. As a result, by mid-1908 Boston Consolidated was forced to go back underground for its profits which added an additional 50 cents a ton to the costs of extraction. However, the open cut mining abandoned by

Table 9

Production Capacity of Major U.S. Copper Mines
(thousand metric tons, unless otherwise specified)

Mine	Current	Status	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
Arizona:													
Twin Buttes	Anamax Mining Co.	Closed 1985	42	130	130	130	130	130	130	130	130	33	33
Eisenhower/ Patovarda	Anamax/Asarco	Operating	–	–	–	–	–	45	45	45	45	45	45
Sacaton	Asarco	Closed 1984	22	22	22	22	22	22	22	22	22	22	–
Mission	Asarco	Operating	40	40	40	40	40	40	40	40	40	40	40
San Xavier	Asarco	Closed 1985	10	10	14	14	14	14	14	14	14	14	14
Silver Bell	Asarco	Leach only, 1985	23	23	23	23	23	23	23	23	23	23	8
Bagded	Cyprus Minerals Co.	Operating	22	22	68	68	68	68	68	68	78	78	78
Pima	Asarco	Operating	60	60	60	–	60	60	60	60	–	–	–
Sierrita	Duval (Pennzoil)	Operating	100	100	100	100	100	100	100	100	100	100	100
Esperanza	Duval (Pennzoil)	Leach only, 1982	25	25	25	25	25	25	25	6	8	8	8
Mineral Park	Duval (Penzoil)	Closed 1981	18	18	18	18	18	18	18	–	–	–	–
Inspiration	Inspiration Copper	Operating	45	45	45	45	45	50	70	70	70	70	70
Ray	Kennecott	Operating	90	90	90	90	90	90	110	110	100	100	100
San Manuel/ Kalamazoo	Newmont Mining Co.	Operating	120	120	120	120	120	120	120	120	120	120	120
Magma/Superior	Newmont Mining Co.	Closed 1982	40	40	40	40	40	40	40	40	–	–	–
Pinto Valley	Newmont Mining Co.	Operating	70	70	70	70	70	80	85	85	85	85	85
Lakeshore	Noranda Lakeshore	Leach only, 1984		20	20	–	–	22	22	22	22	22	10
Morenci/Metcalf	Phelps Dodge	Operating	150	190	190	190	190	190	190	190	190	215	235
New Cornelia (Ajo)	Phelps Dodge	Leach only, 1985	50	50	50	50	50	50	50	50	50	50	1
New Mexico:													
Chino	Kennecott/ Mitsubishi	Operating	65	65	65	65	65	65	65	65	110	110	110
Tyrone	Phelps Dodge	Operating	100	100	100	100	100	100	100	100	100	115	115
Tyrone Leach	Burro Chief Copper Co.	Operating										15	25
Continental	Sharon Steel Corp.	Inactive 1982	22	22	22	22	22	22	22	22	–	–	–
Utah:													
Carr Fork	Kennecott	Closed 1981	–	–	–	–	1	5	14	–	–	–	–
Bingham	Kennecott	Inactive 1985	230	230	230	230	230	230	230	230	230	230	230
Number of Operating Mines:													
Copper Mines			48	46	44	42	40	41	41	35	31	31	27
By-product Mines			65	39	40	42	40	38	57	79	74	43	41

Source: U.S. Bureau of Mines

Note: Dashes indicate no production.

Boston Consolidated was successfully implemented at the Bingham site only a few months later by the2 then-rival operation, Utah Copper Company. The forced retreat to underground mining, coupled with an unstable 1907 economy, left Boston Consolidated a weakened concern, susceptible to take-over. Eventually Newhouse's company and the Bingham properties were acquired by the Utah Copper Company with the take-over complete in 1910.

Utah Copper Company

It was the Utah Copper Company, born from the genius of a forward-thinking metallurgical engineer named Daniel C. Jackling, that took the properties of "Colonel" Wall and turned them into a viable mining interest. These properties, combined with the Consolidated Copper property, became the Bingham Mine. The secret was economies of scale based on the principle that costs of production did not rise proportionately with the volume of ore handled.

Jackling, by combining his understanding of the mountain and its metals with his knowledge of finance, deftly coordinated the needed purchases and capital necessary to realize the potential fortune buried at Bingham. Having recognized the potential of the Bingham deposit in 1898, when he conducted ore sample testing for an employer once interested in the property, Jackling's six-year effort paid off through his orchestration of the creation of the Utah Copper Company in 1903.

Utah Copper's open cut mining effort began at Bingham in 1906. Utilizing three steam shovels, four small locomotives with six-yard wooden dump cars, the effort moved approximately 700,000 cubic yards of earth during that year, exposing almost six acres of ore. Underground mining was not abandoned during this time, either. While layers of the earth were being hauled away at the surface, tunneling continued in its depths.

Guggenheim Investments

Much of the growth at Bingham was financed by the Guggenheim family which had made its fortune in a lace and embroidery business. Their fortune was greatly enhanced, however, by the Guggenheim's expansion into non-ferrous metal production starting with silver and lead mining.

The Garfield Smelter was erected by the American Smelting and Refining Company (ASARCO), a separate Guggenheim company, given a 20-year smelting contract by Utah Copper. In addition to the smelter, the Guggenheims also provided the funds for the construction of Utah Copper's Garfield Concentrator shortly after assuming financial responsibility for that company as well.

Kennecott Copper Corporation's Entry

This financial arrangement combined with the leadership of Jackling enabled Utah Copper Company to grow healthily through the years. In the 1910s the Guggenheims created a holding company for all their copper concerns to dilute costs to be incurred in developing their Kennecott Mine in Alaska. The holding company, named Kennecott Copper Corporation, was thus born in 1915 and in December of that year received in acquisition from the Guggenheim Exploration Company, 404,504 shares of Utah Copper Company stock. After acquiring a 77 percent controlling interest over several years, Kennecott then took over all properties formerly owned by the now absorbed Utah Copper Company. In 1947 Kennecott officially dissolved the Utah Copper Company and created the Utah Copper Division which, from 1949 to 1968, was under the guidance of Kennecott's Salt Lake-based Western Mining Division. With 1968 organizational changes, governance of the Bingham complex became the responsibility of the Metal Mining Division, and remained under those auspices until the corporation was purchased by Standard Oil of Ohio.

After the Utah Copper Company absorption, the Magna and Arthur mills were improved and expanded over the years. The recovery of copper from the ores being milled rose from 61 percent in the early 1900s to 90 percent in 1963. The Garfield Refinery was completed in 1950 and in 1959 Kennecott acquired ASARCO's Garfield Smelter, the largest in the world at that time. With business booming and technology improving, the demand for Bingham's by-products grew. It was the importance of the by-products to Kennecott's copper operation which culminated in Kennecott's dedication of the Mineral Research Laboratory at the University of Utah in 1954. This facility was created for the purpose of expanding research for not only the Bingham property, but also for Kennecott's Nevada, Ray and Chino mines. The goal of the laboratory was to seek

out mineral recovery innovations for the harvesting of copper's by-products which included gold, silver, molybdenum, palladium and platinum.

Kennecott's non-ferrous interests were not all tied to Utah or to copper. In its heyday, Kennecott had not only its mines in New Mexico and Arizona; but also a Nevada Mines Division; a Tintic Division for mining lead at Eureka, Utah; Quebec Iron and Titanium and the Ozark Lead Company in Missouri. In addition, Kennecott had its Baltimore Refinery to handle the refining requirements of the El Teniente Mine in Chile. Richards Bay, South Africa mining also had some Kennecott involvement. A silver mine in Mexico and the ownership of Chase Brass and Copper Company, with a fabrication plant in Cleveland, Ohio, rounded out the list of Kennecott's major holdings.

Copper Prosperity

The 1950s and 1960s were the glory days of copper and Kennecott. The intensity of electrical usage had a great impact on its number one conductor--copper, with demand for electricity creating proportional demand for copper. The world economy was expanding. New copper-demanding technologies were emerging. Copper by-products were also in demand. Kennecott and Anaconda were profiting not only from their U.S. properties, but by their ownership of South America properties. Africa was not yet an important producer, impeded in part by political unrest in Belgian holdings.

It was also during this period that the Bingham Mine became a major pillar of the Utah economy. Employing nearly 8,000 people during its peak years in the late 1960s and early 1970s, Kennecott put as much as $204 million per year into the Utah economy by means of its payroll. It contributed a yearly average of $22 million in Utah taxes between the years 1965 and 1984 (Table 10). Not only did Kennecott contribute to the employment and tax bases of the state, but it also made an impact on Utah's economic and business climate through its in-state purchases of goods and services, which averaged $168 million a year during the same period.

But underneath this prosperity, the seeds of trouble were being planted and sprouting. Internationally, Chile and Peru expropriated Kennecott and Anaconda properties with minimal compensation in

Table 10

Kennecott-Utah Copper Division Contributions
to the Utah Economy
(thousands of dollars)

Year	Total Payroll	Utah Taxes		Other Expenditures in Utah	Total Employees 12/31
		Property	Income		
1946	$ 6,363	$ 1,844	$ 2,730	$ 5,759	3,737
1950	19,398	4,871	7,225	21,714	4,946
1955	28,166	8,471	12,220	24,406	6,408
1960	48,763	6,228	9,866	31,846	7,561
1965	69,911	9,581	15,508	81,145	7,538
1970	86,115	16,546	28,834	84,648	7,990
1975	115,647	17,998	29,729	144,589	6,327
1980	167,729	7,904	17,947	182,203	7,002
1981	203,599	9,306	21,303	228,416	6,637
1982	190,135	9,357	20,827	222,557	4,841
1983	174,295	11,146	23,762	217,639	4,959
1984	134,668	10,039	20,630	185,007	2,532
1985	46,228	6,551	8,155	64,371	240

Source: Kennecott Corporation, 1987.

1971 as previously noted. In Africa, the new nations of Zambia and Zaire were bringing some order out of the chaos of expulsion of the Belgians. Kennecott not only lost a lucrative property in Chile, it accumulated low cost international competitors.

Union Changes

On the labor front, a change of union representation had unforeseen long-range consequences. Historically, copper miners had been represented by the Mine-Mill and Smelter Workers Union--an organization with radical roots going back to the Industrial Workers of the World and the Western Federation of Miners. During the Great Depression of the 1930s and the USA/USSR alliance of World War II, the boundaries between radicalism and communism became such that Mine-Mill was one of those unions expelled from the Congress of Industrial Organizations in 1949, preparatory to its 1955 merger with the American Federation of Labor into the AFL-CIO. Jurisdiction over copper mining, smelting and refining facilities was eventually awarded to the United Steel Workers of America with instructions to raid and take over Mine-Mill bargaining units.

From the industry point of view, the effect was to transfer employer representation from a relatively weak, decentralized and nearly bankrupt union attuned to copper industry conditions to a strong, centralized and well financed union with policies and practices developed in a quite different industry. Where Mine-Mill negotiated property by property, the Steelworkers sought industry-wide bargaining. When they could not achieve it, they insisted on pattern bargaining. With Kennecott as the richest company in the industry, the usual practice was to approach Kennecott first. While Kennecott, along with other domestic producers, endured strikes at almost every contract expiration, the potential for profit from minimizing interruption of production was more significant to Kennecott as a function of its size. Also because Kennecott was the largest, it risked the greatest economic sacrifice if it were shut down. A constant trade-off was faced between restraining wage increases and controlling work practices on the one hand or accomplishing a speedy return to production and profitability on the other. Then with Kennecott back to work, the other companies could not take an extended strike while Kennecott fed their customers.

An additional complication was that both Mine-Mill and the Steelworkers represented primarily the semiskilled workers and operators of the industry. Craft unions had to be placated also in coalition bargaining where small holdout groups had tremendous leverage on the whole. Focus on the wage bargaining with lesser emphasis on local working practices often contributed to labor cost escalation.

All of this was capped by the acceptance from the steel industry pattern of a cost of living allowance in 1971 on the eve of the impact of the Organization of Petroleum Exporting Countries (OPEC) on U.S. oil prices and consequently on the entire price level. The outbreak of inflation thereupon escalated average hourly wages in the U.S. copper industry from $4.04 in 1971 to $12.53 in 1982, concurrently with the growth of international competition.

Corporate Structure Changes

Simultaneously, dramatic changes in corporate structure were occurring during the 1970s as consequences of Kennecott's wealth during the golden years of the 1960s and its accelerated cash flow from the multiplying gold prices of the 1970s. The Kennecott Copper Corporation was vulnerable to take-over as a "cash cow." To reduce its attractiveness and also to give itself a stake in the promising alternative energy market, Kennecott bought Peabody Coal Company, in 1966, the nation's largest coal producer. However, the Justice Department and the courts forced divestiture for antitrust reasons. The divestiture burdened Kennecott with a cool $1 billion, further enhancing its target status. Kennecott spent over half of its liquid excess to buy the Carborundum Corporation, paying $567 million in the hope of reducing its attractiveness, but was still pursued by Curtiss-Wright Corporation in a take-over attempt thwarted at high cost to both companies. Two years later, Kennecott counterattacked by tendering a $164 million offer for the aerospace company. After a lengthy battle in the boardrooms and in the courts, Kennecott withdrew its offer in a settlement that left the copper company with the one-time Curtiss-Wright holding, Dorr Oliver.

Waiting in the wings when the dust cleared from the acquisition battles was the future parent

company, Standard Oil of Ohio (SOHIO), ready to take Kennecott into its ranks. SOHIO, 53 percent owned by British Petroleum, Ltd., was looking for diversification outlets to absorb its swollen Alaskan North Slope oil profits. Kennecott was an attractive acquisition, not only because of its liquid assets but because of its expected continuing income with copper prices the year prior to the merger at an all time high. In 1980 prices on the London Metal Exchange (LME) averaged $ .9929 and the U.S. producer price averaged $1.0137 (Table 11). SOHIO paid $1.7 billion at $62 per share for shares selling prior to the merger announcement at $27.12. Ironically, the year of the merger was to mark the start of the U.S. copper decline with the world prices dropping 20 cents in 1981, the first year of SOHIO'S ownership of Kennecott, continuing the downward trend to an average of 61 cents per pound in 1985.

Selling at 61 cents and below, copper produced at an estimated 70 cents per pound is not a profitable enterprise. Kennecott lost nearly $59 million in the six months following SOHIO's 1981 takeover and $91 million in 1983. All of its U.S. competitors were having similar experiences. Labor costs, having risen 118 percent, with prices increasing only 72 percent between 1967 and 1977, were the obvious target for cost cutting. All labor agreements in the industry expired and were renegotiated in 1983. While all companies were feeling the pinch of the industry's economic downturn, each company had its own version of needed concessions.

ESP Plan

In the early 1960s, Kennecott agreed to an Employment Security Plan (ESP) which guaranteed continued employment to workers displaced by modernization or implementation of new technologies. As long as the ESP remained in the contract, any extensive modernization program would carry prohibitive costs. Abolishing ESP was the overriding goal of Kennecott management. Eliminating the COLA which had been the cause of the wage escalation was secondary.

Phelps Dodge did not have an Employment Security Plan and placed its highest priority on eliminating the COLA which the Kennecott agreement retained. At that point, Phelps Dodge, the second

Table 11

Copper Prices
1946 - 1985

Year	U.S. Producer	London Metal Exchange
1946	13.820	13.900
1947	20.958	23.500
1948	22.038	24.100
1949	19.202	21.900
1950	21.235	22.400
1951	24.200	27.500
1952	24.200	32.300
1953	28.798	32.200
1954	29.694	31.300
1955	37.491	43.900
1956	41.818	44.100
1957	29.576	27.400
1958	25.764	24.800
1959	31.182	29.800
1960	32.053	30.800
1961	29.921	28.700
1962	30.600	29.300
1963	30.600	29.300
1964	31.960	44.000
1965	35.017	58.600
1966	36.170	69.100
1967	38.226	51.200
1968	41.847	56.000
1969	47.534	66.300
1970	57.700	62.900
1971	51.433	49.300
1972	50.617	48.545
1973	58.865	80.805
1974	76.649	93.097
1975	63.535	56.110
1976	68.824	64.051
1977	65.804	59.380
1978	65.510	61.826
1979	92.334	90.113
1980	101.374	99.297
1981	83.744	79.488
1982	72.909	67.192
1983	77.861	72.153
1984	66.757	62.562
1985	65.566	64.904

Source: Metal Works, Handy and Harman, Metal Bulletin, Federal Reserve, 1985.

largest producer, dug in its heels and refused to accept the Kennecott pattern. Since the union could not grant major concessions at Phelps-Dodge without negating the agreement at Kennecott, a stalemate Kennecott management announced the shutdown of the Bingham facility. With the Bingham Mine closed, only a security force of 240 people at the mine and a small headquarters staff were left on the payroll.

Future of the U.S. Copper Industry

Despite its low ebb in the mid-1980s, the copper industry demonstrated remarkable faith in its own future--and put its money where its faith was. Kennecott and its Standard Oil parent have played a significant role in that industry determination.

With the collective bargaining agreement scheduled to expire on June 30, 1986, but with all of the facilities idle and their employees on layoff, Kennecott offered to reopen and implement its plan to invest $450 million in a modernization program if the union would accept an average cut of $3.22 an hour in wages. In addition, Kennecott management demanded the elimination of the COLA and a COLA float of 16 cents per hour that was in place. The union membership accepted the Kennecott terms. In the interest of the Company's continued copper processing and employment, employees on the average sacrificed over $5.00 an hour in wages and benefits and agreed to significant work rule changes.

True to its commitment in the 1986 labor negotiation, Kennecott both rewarded the positive union ratification vote with a $1,000 bonus to the 130 people working during the shutdown and to the first 1,878 eligible employees on the division recall list, and launched a $450 million modernization program. As the construction progressed at Bingham, Kennecott's Ray Mining Division in Arizona was sold to ASARCO for $72 million, while its remaining two-thirds interest in the Chino Mine in New Mexico (the remainder owned by the Japanese firm, Mitsubishi) was sold to Phelps-Dodge. The total revenues from these two sales equalled 42 percent of the Bingham modernization costs.

The Phelps-Dodge acquisition was part of its $275 million commitment to acquire new facilities and upgrade existing ones. ASARCO, too, is determined to become lean and prosperous, having instituted a $75 million cost-saving program and used available credit to buy potentially profitable concerns such as Kennecott's Ray Mine Division at advantageous prices. Magma Copper, newly spun-off from Newmont, is also poised to fight, gaining access to developed. Phelps-Dodge ended up breaking a bitter strike over the COLA provisions and became a non-union operation, doing away completely with COLAs and achieving wage scales substantially below the other producers that accepted the Kennecott pattern.

Shutdown

With the mounting losses evident by the end of 1983, Kennecott and its followers attempted to persuade the unions to grant mid-contract concessions in 1984. Unsuccessful, Kennecott resolved to cut labor costs by a massive layoff consequent to a drastic cutback in production. Employment had fallen from the peak of almost 8,000 in 1970 to 4,841 in 1982, including a cutback of 575 salaried positions in the latter year. Another nearly 2,000 employees were laid off in 1983, including 76 headquarters staff. Claiming a loss of $25 million a quarter prior to their eventual closure, Kennecott became firm in its demand that the union accept a $6.00/an hour wage and benefit cut by March 1985 or face shutdown. Shortly after the union determined it was unwilling or unable to concede by the date given, $300 million in credit to implement its five-point survival program.

All of this is based on the assumption that somewhere around 60 cents a pound is as low as the South Americans and Africans can afford to produce copper and therefore the bottom of the world price trend (Table 11). U.S. firms which can drive their production costs down far enough to make an acceptable profit at those prices can stay in the game. The efforts of ASARCO, Phelps Dodge, Magma and Kennecott to regain profitability are demonstrations of an admittedly smaller, but stronger industry's determined action to regain its competitive position in the world market. Kennecott's commitment to be the lowest cost domestic producer, while maintaining collective bargaining relations with its employees is a formidable undertaking. But with prolonged union cooperation, it may be a manageable challenge. Those firms which can use the SXEW process expect to be able to push the costs for some small portions of their production as low as 29 cents

per pound. Kennecott's commitment is a riskier gamble.

Advantages and Disadvantages of the Bingham Mine

Bingham's ore grade of mined copper fluctuates between .60 and .75 percent with a three-year average in the area of .67. However, this comparatively low ore grade is compensated by its open pit mining method offering economies of scale sufficient to make the processing of low grade ore economically feasible. Kennecott is the third largest producer of gold in the U.S., with most of its supply coming from the Bingham operation. Bingham's output also includes silver and molybdenum, along with other minor by-products, that together with gold production have often meant the difference between operating and closing.

Standard Oil apparently feels that it could make a greater return on its investment elsewhere and has recently announced its intent to divest itself of all non-petroleum interests. It appears likely, therefore, that the Kennecott parent is striving to bring the Bingham complex to a sufficient level of profitability to make it an attractive article for sale. However, whether owned by SOHIO or some other entity such as Phelps-Dodge or ASARCO, prospects for the Bingham complex are made favorable by SOHIO's current willingness to underwrite the costs of modernization and the demonstrated willingness of the employees and their union to contribute through concessions in wages and other labor cost factors. Paradoxically, as the result of the 1986 concessions, the wage rate at Kennecott and the other still unionized companies is now below that paid by Phelps-Dodge at their de-unionized facilities, though their purchase of Chino will force some resolutions of those wage differences.

Rather than some exotic new technology such as SXEW or flash furnaces, Kennecott's modernization is primarily a streamlining of material handling and an increase in human resource and operating efficiencies. Kennecott's traditional practice has been to blast in the mine and then load trucks and railcars with the resulting ore for transport to the concentrator where the ore is crushed and concentrated. The modernization being implemented will do away with the railroad completely and will reduce significantly the use of the large hauling trucks. After blasting, the ore will be initially crushed in an in-pit crusher and then be conveyed on belts through the existing railroad tunnel to stockpiles at the Copperton Concentrator. After processing through these grinding and flotation facilities near the mine, the concentrate will be transported via pipeline to the smelter and the wash will be carried in water to the tailings pond where water will be recycled back to the concentrator through a third pipeline for reuse in waste transport. In the process, labor requirements will be reduced, an expected 1,800 employees producing at an average annual level of 185,000 tons; whereas 2,532 employees produced 170,000 tons in 1984, by the previous methods. The declared intent is to become the lowest cost producer in the industry.

Future Prospects at Bingham

Whatever the name of the ultimate operating entity, the prospects for continued operation of the Bingham complex are favorable, though by no means assured. The cost of copper on the open market becomes the first and most perilous factor in Bingham's future. Prices have persistently trended downward during the 1980s, but they are now thought to be close to the cost of production of the marginal producer. They will fall only if demand decreases substantially or other major producers are able to reduce their costs sharply. Price stabilization, even at such a low level, would be helpful in determining long-term potential. A margin of even 8 to 10 cents between the world price and production costs is relatively narrow but satisfactory at Bingham's high volume potential, 185,000 tons per year being the planned volume after modernization is completed. At prices between 57 and 61 cents per pound, that would result in profits between $15 million and $26 million per year, according to union calculations.

The other major factors in the favorable outlook are the company's commitment to lean and efficient management and the willingness of the employees to make reasonable concessions in the interest of the mine's continued feasibility and the protection of their jobs. Included along with the wage and benefit concessions have been work rules changes which contribute to a profitable operation that can compete effectively against new technology and foreign production.

Current plans are for employment to rise to a peak of 2,200 during a period which combines production and construction, then to decline to 1,800 as a permanent complement. At that point, Kennecott should contribute annually to the Utah economy, $65 million in payroll, along with taxes and purchased goods and services not unlike the $30 million and $185 million respectively of 1984.

The Bureau of Economic and Business Research, University of Utah, calculates the earnings multiplier for nonferrous mining and manufacturing in Utah--primarily copper--at 2.93. The $65 million payroll, therefore, should add $190,450,000 annually to Utah's total personal income, an increase of just under 1 percent. More visibly, on the job front, applying the multiplier to the 1,800 Kennecott jobs would result in a total of about 5,400 additional jobs in the state. However, that calculation was based on the productivity rates which existed prior to the modernization. With increased productivity, the jobs multiplier will now be somewhat higher but information is not currently available to calculate what the correct figure will be. In addition to the permanent increase will be the one-time multiplied effect of whatever part of the $450 million modernization is spent for payroll within the state.

The Bingham Mine will never again play the dominant role it once did on the Utah scene but it still has a positive contribution to make for long into the future. The investment in modernization is a declaration of faith, especially heartening in Utah at the present time.

Utah Business Statistics

UTAH DATA	Nov 1985	Nov 1986	% Change From Year Ago	12 Month Average This Year	12 Month Average Last Year	12 Month Average % Change
Total Personal Income (seasonally adjusted) (mil. of dol.) (qtly.)	17,523	NA	NA	NA	17,169	NA
New Corporations (no.)	423	338	-20.1%	462	441	5.0%
New Car, Truck and Motorhome Sales (no.)	5,804	5,037	-13.2%	6,204	6,525	-4.9%
Agriculture						
Average Prices Recorded by Farmers (dol.)						
Beef Steers and Heifers (cwt) (thous.)	59.60	58.00	-2.7%	55.1	56.4	-2.4%
Lambs (cwt)	58.70	68.30	16.4%	65.0	62.9	3.4%
Milk Wholesale (cwt)	12.10	12.60	5.8%	11.8	12.3	-3.7%
Alfalfa Hay, Baled (per ton)	69.00	65.00	-5.8%	69.1	72.3	-4.5%
Cattle Slaughtered (live weight) (thous. of lbs.)	33,828	35,171	4.0%	36,384	32,336	10.5%
Construction						
Total Construction (thous. of dol.)[1]	91,300	103,660	13.5%	127,482	136,008	-6.3%
Residential	43,000	58,637	36.4%	59,667	62,441	-4.4%
Nonresidential	45,200	29,479	-34.8%	47,275	42,500	11.2%
Public Works and Utilities	3,100	15,544	401.4%	20,789	31,050	-33.0%
Total Permit Construction (thous. of dol.)[2]	99,522.9	73,615.3	-26.0%	109,205.9	116,077.6	-5.9%
Residential	42,924.5	39,579.6	-7.8%	58,937.9	58,560.7	0.6%
Nonresidential	43,469.9	23,461.8	-46.0%	36,641.8	42,739.1	-14.3%
Additions, Alterations and Repairs	13,128.5	10,573.8	-19.5%	13,646.7	14,277.8	-4.4%
New Dwelling Units (no.)	845	762	-9.8%	1,112	1,270	-12.4%
Employment						
Civilian Labor Force (thous.)	787.6	770.6	-2.2%	751.0	749.7	0.2%
Total Employed Persons	739.3	724.7	-2.0%	708.4	702.7	0.8%
Unemployed Persons	44.3	45.9	-5.0%	42.3	47.1	-10.2%
Percent Total Labor Force	6.1	6.0	-1.6%	5.6	6.3	-10.6%
Employees on Nonagricultural Payrolls (thous. of jobs)	636.6	644.5	1.2%	635.2	622.6	2.0%
Manufacturing	95.7	91.1	-4.8%	92.1	95.8	-3.8%
Mining	9.0	8.2	-8.8%	8.3	10.1	-17.6%
Contract Construction	37.9	33.8	-10.8%	34.0	36.3	-6.4%
Transportaion, Communication and Utilities	36.4	37.5	3.0%	37.4	36.6	2.2%
Wholesale Trade	36.0	36.0	0.0%	35.8	35.7	0.1%
Retail Trade	116.9	121.7	4.1%	116.6	111.8	4.3%
Finance, Insurance and Real Estate	31.3	33.3	6.4%	32.9	31.0	6.2%
Services[3]	132.9	139.3	4.8%	137.6	129.7	6.0%
Federal Government	39.4	39.8	1.0%	40.4	39.0	3.8%
State Government[4]	36.7	38.9	6.0%	38.1	35.4	7.6%
Local Government[4]	64.3	65.0	1.1%	63.0	61.4	2.6%
Average Weekly Hours[5]						
Manufacturing	40.9	40.4	-1.2%	40.4	40.2	0.5%
Mining	45.6	43.3	-5.0%	43.6	44.5	-2.1%
Wholesale Trade	35.3	35.8	1.4%	36.3	35.7	1.8%
Retail Trade	28.1	28.3	0.7%	28.1	28.6	-1.7%
Amount of Unemployment Compensation (thous. of dol.)	5,502.8	9,245.2	67.1%	8,324.0	6,952.5	19.7%
Finance						
Savings, Savings and Loan Association (mil. of dol.)	1,997.1	2,409.9	20.7%	2,386.5	2,333.3	2.3%
Tax Collections by the State of Utah (thous. of dol.)						
Total Tax Collections	240,132.0	241,246.5	0.5%	124,448.2	123,297.6	0.9%
Sales and Use Tax	120,791.3	129,354.4	7.1%	45,360.7	45,063.1	2.0%
Motor Fuel Tax	3,775.1	4,332.6	14.8%	7,721.6	7,243.0	6.6%
Individual Income Tax	62,544.1	64,537.4	3.2%	38,641.3	37,312.5	3.6%
Corporation Franchise Tax	3,061.5	511.2	-83.3%	4,799.8	5,148.2	-6.8%
Production						
Net Electric Power Utilized (mil. of kwh)	1,150.5	1,081.3	-6.0%	1,098.3	1,108.7	-0.9%
Crude Oil to Refineries (thous. of bbls.)	3,615.0	4,145.4	14.7%	3,765.8	4,083.7	-7.8%
Crude Oil (thous. of bbls.)	3,487.1	3,169.1	-9.1%	3,292.9	3,363.8	-2.1%
Natural Gas (mil. of cu. ft.)	19,763.9	21,683.2	9.7%	19,340.7	16,971.7	14.0%
Coal (thous. short tons)	1,103.0	783.0	-29.0%	982.6	982.5	0.0%
Tourism/Travel						
Air Passengers (total no. on and off) (S.L. Int'l Airport)	606,054	709,324	17.0%	827,956	730,443	13.3%
Highway Traffic Count Across State Lines	27,411	32,191	17.4%	36,673	34,577	6.1%
Transient Room Taxes (thous. of dol.)	1,671.9	1,109.7	-33.6%	378.7	489.6	-22.7%
Visits, State, Nat'l. Parks, Monuments (thous.)	300.3	317.9	5.9%	1,014.4	908.6	11.6%
Utilities						
Telephone Lines in Service (Mt. Bell) (Residential)	468,453	477,530	1.9%	471,512	460,915	2.3%
Telephone Lines in Service (Mt. Bell)(Nonresidential)	165,894	171,048	3.1%	168,218	165,438	1.7%
Electric Customers (Residential)	NA	466,676	NA	460,398	NA	NA
Electric Customers (Commercial)	NA	45,206	NA	45,046	NA	NA
Natural Gas Customers (Residential & Commercial)	424,842	439,183	3.4%	434,772	421,852	3.1%
Natural Gas Customers (Industrial)	571	570	-0.2%	567	554	2.3%

Utah Business Statistics

UTAH DATA	Nov 1985	Nov 1985	% Change From Year Ago	12 Month Average This Year	12 Month Average Last Year	12 Month Average % Change
Davis County						
Non-Ag. Employment (thous.)	52.0	53.1fo	2.1%	52.3	51.2	2.2%
Unemployment Rate	3.6	4.4	22.2%	4.0	3.8	4.2%
Auth. Permit Construction (thous. of dol.)	24,463.0	9,360.1	-61.7%	14,523.9	13,813.2	5.1%
New Dwelling Units (no.)	526	93	-82.3%	189	185	2.3%
Postal Receipts (thous. of dol.)	282.1	NA	NA	NA	325.0	NA
Electric Customers (Residential)	33,289	46,075	38.4%	44,066	33,464	31.7%
Electric Customers (Commercial)	2,459	3,176	29.2%	3,208	2,480	29.3%
Natural Gas Customers (Residential)	44,715	47,202	5.6%	46,148	43,995	4.9%
Natural Gas Customers (Industrial)	49	51	4.1%	50	49	2.2%
Telephone Lines in Service (Mt. Bell)(Residential)	50,794	53,923	6.2%	52,553	43,687	20.3%
Telephone Lines in Service (Mt. Bell)(Nonresidential)	9,798	10,197	4.1%	10,074	8,376	20.3%
Salt Lake County						
Non-Ag. Employment (thous.)	332.7	339.9fo	2.2%	333.6	324.9	2.7%
Unemployment Rate	5.9	5.2	-11.9%	5.3	5.7	-7.9%
Auth. Permit Construction (thous. of dol.)	58,740.2	32,171.4	-45.2%	58,499.1	55,638.8	5.1%
New Dwelling Units (no.)	485	355	-26.8%	567	542	4.7%
Postal Receipts (thous. of dol.)	8,996.1	7,444.6	-17.2%	7,145.4	7,012.1	1.9%
Electric Customers (Residential)	225,781	233,141	3.3%	231,032	221,248	4.4%
Electric Customers (Commercial)	18,732	19,328	3.2%	19,253	18,438	4.4%
Natural Gas Customers (Residential)	206,862	214,151	3.5%	212,230	204,608	3.7%
Natural Gas Customers (Industrial)	261	253	-3.1%	256	254	0.8%
Telephone Lines in Service (Mt. Bell)(Residential)	219,820	224,798	2.3%	222,190	216,516	2.6%
Telephone Lines in Service (Mt. Bell)(Nonresidential)	106,752	109,246	2.3%	107,760	107,792	-0.0%
Utah County						
Non-Ag. Employment (thous.)	73.0	73.0fo	0.0%	71.4	70.1	1.8%
Unemployment Rate	6.8	7.1	4.4%	6.0	6.6	-6.8%
Auth. Permit Construction (thous. of dol.)	15,126.8	9,582.8	-36.7%	8,861.6	10,759.3	-17.6%
New Dwelling Units (no.)	97	82	-15.5%	101	82	23.7%
Postal Receipts (thous. of dol.)	922.6	955.9	3.6%	915.9	883.2	3.7%
Electric Customers (Residential)	NA	50,278	NA	49,688	NA	NA
Electric Customers (Commercial)	NA	6,206	NA	6,090	NA	NA
Natural Gas Customers (Residential)	58,678	60,259	2.7%	59,592	58,517	1.8%
Natural Gas Customers (Industrial)	70	71	1.4%	71	69	3.1%
Telephone Lines in Service (Mt. Bell)(Residential)	62,879	64,164	2.0%	62,231	61,114	1.8%
Telephone Lines in Service (Mt. Bell)(Nonresidential)	15,169	16,126	6.3%	15,821	14,747	7.3%
Weber County						
Non-Ag. Employment (thous.)	58.6	60.0fo	2.4%	59.2	57.0	3.9%
Unemployment Rate	5.5	6.1	10.9%	5.6	6.0	-6.6%
Auth. Permit Construction (thous. of dol.)	5,830.4	5,971.0	2.4%	9,077.9	8,719.9	4.1%
New Dwelling Units (no.)	39	53	35.9%	77	86	-11.0%
Postal Receipts (thous. of dol.)	583.6	648.0	11.0%	619.0	553.3	11.9%
Electric Customers (Residential)	51,065	52,384	2.5%	51,731	50,603	2.2%
Electric Customers (Commercial)	4,654	4,764	2.4%	4,736	4,609	2.7%
Natural Gas Customers (Residential)	47,088	48,239	2.6%	47,934	46,933	2.1%
Natural Gas Customers (Industrial)	88	86	-2.3%	86	80	7.7%
Telephone Lines in Service (Mt. Bell)(Residential)	45,238	45,241	0.0%	45,368	44,959	0.9%
Telephone Lines in Service (Mt. Bell)(Nonresidential)	10,570	10,567	-0.0%	10,562	10,355	2.0%

r Revised fo Forecast na - Not available

Sources:

Personal Income:	Bureau of Economic Analysis, U.S. Department of Commerce
New Corporations:	Utah Secretary of State
New Car and Truck Sales:	Utah State Tax Commission, Economic and Statistical Unit
Agriculture:	U.S. Department of Agriculture, Agriculture, Utah: Utah Crop and Livestock Reporting Service
Construction Data:	F.W. Dodge Statistics and Utah Construction Report, Bureau of Economic and Business Research
Employment Data:	Utah Department of Employment Security
Savings Information:	Utah Savings and Loan Institutions
Tax Collections:	Utah State Tax Commission
Net Electric Power Utilized:	Cooperating Utah power companies
Crude Oil Production:	Area oil refineries
Natural Gas Production:	Utah Department of Oil, Gas, and Mining
Coal Production:	U.S. Department of Energy
Air Passengers:	Salt Lake City International Airport, Statistics Division
Highway Traffic Count:	Utah Department of Transportation
Visits to State and National Parks and Monuments:	U. S. Forest Service, Utah State Parks and Recreation Department
Utilities Data:	Cooperating Utah utility companies
Postal Receipts:	Postmasters in Davis, Salt Lake, Utah, and Weber Counties

Footnotes:

1 Obtained from F.W. Dodge Statistics
2 Obtained from Utah Construction Report
3 Includes services by nonprofit and religious institutions
4 Includes public schools and college institutions
5 Contract construction data are no longer available

Utah Business Statistics

UTAH DATA	Dec 1985	Dec 1986	% Change From Year Ago	12 Month Average This Year	12 Month Average Last Year	12 Month Average % Change
Total Personal Income (seasonally adjusted) (mil. of dol.) (qtly.)	17,523	NA	NA	NA	17,258.5	NA
New Corporations (no.)	485	531	9.5%	467	444	5.2%
New Car, Truck and Motorhome Sales (no.)	5,102	6,545	28.3%	6,325	6,516	-2.9%
Agriculture						
Average Prices Recorded by Farmers (dol.)						
Beef Steers and Heifers (cwt) (thous.)	57.90	58.40	0.9%	55.10	56.13	-1.8%
Lambs (cwt)	55.60	70.50	26.8%	66.28	62.56	5.9%
Milk Wholesale (cwt)	12.30	12.70	3.3%	11.83	12.14	-2.5%
Alfalfa Hay, Baled (per ton)	75.00	63.00	-16.0%	68.06	72.33	-5.9%
Cattle Slaughtered (live weight) (thous. of lbs.)	33,300	42,442	27.5%	37,146	33,282	11.6%
Construction						
Total Construction (thous. of dol.) [1]	60,000	72,559	20.9%	128,529	131,783	-2.5%
Residential	33,700	41,548	23.3%	60,322	61,025	-1.2%
Nonresidential	14,500	27,277	88.1%	48,340	42,183	14.6%
Public Works and Utilities	11,800	3,734	-68.4%	20,118	28,567	-29.6%
Total Permit Construction (thous. of dol.) [2]	106,757.4	115,849.5	8.5%	109,963.6	120,178.0	-8.5%
Residential	31,001.7	39,219.0	26.5%	59,622.7	58,849.6	1.3%
Nonresidential	68,064.6	68,283.6	0.3%	36,660.1	46,807.9	-21.7%
Additions, Alterations and Repairs	7,691.1	8,346.9	8.5%	13,701.3	13,970.5	-1.9%
New Dwelling Units (no.)	583	673	15.4%	1,120	1,271	-11.8%
Employment						
Civilian Labor Force (thous.)	739.6	763.0	3.2%	753.0	750.2	0.4%
Total Employed Persons	695.7	717.4	3.1%	710.2	703.4	1.0%
Unemployed Persons	43.9	45.6	3.9%	42.5	46.8	-9.3%
Percent Total Labor Force	5.9	6.0	1.7%	5.6	6.3	-9.9%
Employees on Nonagricultural Payrolls (thous. of jobs)	638.1	644.0	0.9%	635.7	624.1	1.9%
Manufacturing	93.0	90.6	-2.6%	91.9	95.5	-3.8%
Mining	9.0	8.5	-5.6%	8.2	9.8	-16.0%
Contract Construction	34.0	30.5	-10.3%	33.7	36.1	-6.7%
Transportaion, Communication and Utilities	37.6	37.9	0.8%	37.4	36.6	2.0%
Wholesale Trade	35.8	36.4	1.7%	35.8	35.8	0.2%
Retail Trade	119.3	123.1	3.2%	117.0	112.2	4.2%
Finance, Insurance and Real Estate	32.0	33.2	3.8%	33.0	31.1	6.1%
Services [3]	136.0	140.5	3.3%	138.0	130.6	5.7%
Federal Government	39.7	40.5	2.0%	40.5	39.2	3.4%
State Government [4]	37.8	37.7	-0.3%	38.1	35.6	7.0%
Local Government [4]	64.0	65.2	1.9%	63.1	61.7	2.3%
Average Weekly Hours [5]						
Manufacturing	41.5	38.8	-6.5%	40.2	40.3	-0.3%
Mining	46.3	44.0	-5.0%	43.4	44.7	-2.8%
Wholesale Trade	32.4	38.4	18.5%	36.8	35.3	4.4%
Retail Trade	29.1	28.3	-2.7%	28.0	28.6	-1.9%
Amount of Unemployment Compensation (thous. of dol.)	8,832.6	10,469.8	18.5%	8,460.4	7,155.0	18.2%
Finance						
Savings, Savings and Loan Association (mil. of dol.)	2,386.7	2,458.0	3.0%	2,392.4	2,338.4	2.3%
Tax Collections by the State of Utah (thous. of dol.)						
Total Tax Collections	69,099.7	58,272.5	-15.7%	123,546.0	124,155.6	-0.5%
Sales and Use Tax	3,763.1	2,087.6	-44.5%	45,821.1	45,144.7	1.5%
Motor Fuel Tax	11,201.0	10,807.0	-3.5%	7,688.7	7,653.5	0.5%
Individual Income Tax	32,522.0	33,653.1	3.5%	38,735.6	37,229.5	4.0%
Corporation Franchise Tax	1,523.1	(920.0)	-160.4%	4,596.2	5,436.7	-15.5%
Production						
Net Electric Power Utilized (mil. of kwh)	1,223.2	1,196.4	-2.2%	1,096.1	1,115.7	-1.8%
Crude Oil to Refineries (thous. of bbls.)	3,807.8	4,153.0	9.1%	3,794.6	4,045.0[P]	-6.2%
Crude Oil (thous. of bbls.)	3,592.9	3,161.5	-12.0%	3,257.0	3,399.5	-4.2%
Natural Gas (mil. of cu. ft.)	21,133.0	23,026.1	9.0%	19,498.5	17,451.3	11.7%
Coal (thous. short tons)	1,071.0	708.0[P]	-33.9%	952.3	940.3	1.3%
Tourism/Travel						
Air Passengers (total no. on and off) (S.L. Int'l Airport)	767,438	816,773	6.4%	832,068	738,075	12.7%
Highway Traffic Count Across State Lines	27,151	31,885	17.4%	37,068	34,703	6.8%
Transient Room Taxes (thous. of dol.)	(572.1)	454.9	-179.5%	464.3	401.7	15.6%
Visits, State, Nat'l. Parks, Monuments (thous.)	259.0	269.4	4.0%	1,015.3	911.3	11.4%
Utilities						
Telephone Lines in Service (Mt. Bell) (Residential)	469,523	478,559	1.9%	472,265	461,855	2.3%
Telephone Lines in Service (Mt. Bell)(Nonresidential)	166,754	171,887	3.1%	168,646	165,585	1.8%
Electric Customers (Residential)	448,658	469,000	4.5%	462,094	NA	NA
Electric Customers (Commercial)	43,615	45,762	4.9%	45,226	NA	NA
Natural Gas Customers (Residential & Commercial)	432,896	443,847	2.5%	435,685	422,987	3.0%
Natural Gas Customers (Industrial)	568	563	-0.9%	567	559	1.6%

Utah Business Statistics

UTAH DATA	Dec 1985	Dec 1986	% Change From Year Ago	12 Month Average This Year	12 Month Average Last Year	12 Month Average % Change
Davis County						
Non-Ag. Employment (thous.)	51.9	52.8 fo	1.7%	52.4	51.3	2.2%
Unemployment Rate	3.7	4.7	27.0%	4.0	3.8	7.6%
Auth. Permit Construction (thous. of dol.)	6,047.8	7,904.2	30.7%	14,678.6	13,942.5	5.3%
New Dwelling Units (no.)	70	88	25.7%	191	187	2.1%
Postal Receipts (thous. of dol.)	356.4	NA	NA	NA	316.3	NA
Electric Customers (Residential)	33,526	46,394	38.4%	45,133	33,621	34.3%
Electric Customers (Commercial)	2,491	3,215	29.1%	3,268	2,485	31.5%
Natural Gas Customers (Residential)	45,394	47,984	5.9%	46,371	44,173	5.0%
Natural Gas Customers (Industrial)	49	52	6.1%	51	50	2.0%
Telephone Lines in Service (Mt. Bell)(Residential)	50,935	54,187	6.4%	52,825	44,723	18.1%
Telephone Lines in Service (Mt. Bell)(Nonresidential)	9,822	10,207	3.9%	10,106	8,583	17.7%
Salt Lake County						
Non-Ag. Employment (thous.)	332.6	339.7 fo	2.1%	334.2	325.5	2.6%
Unemployment Rate	5.6	5.0	-10.7%	5.2	5.7	-8.1%
Auth. Permit Construction (thous. of dol.)	64,094.7	81,447.3	27.1%	59,945.1	58,561.5	2.4%
New Dwelling Units (no.)	288	312	8.3%	570	538	5.8%
Postal Receipts (thous. of dol.)	9,559.6	7,872.5	-17.6%	7,004.8	7,215.6	-2.9%
Electric Customers (Residential)	230,035	235,257	2.3%	231,468	222,115	4.2%
Electric Customers (Commercial)	18,957	19,690	3.9%	19,314	18,501	4.4%
Natural Gas Customers (Residential)	210,784	216,416	2.7%	212,700	205,279	3.6%
Natural Gas Customers (Industrial)	260	253	-2.7%	256	257	-0.3%
Telephone Lines in Service (Mt. Bell)(Residential)	220,364	225,121	2.2%	222,587	217,006	2.6%
Telephone Lines in Service (Mt. Bell)(Nonresidential)	107,087	109,806	2.5%	107,997	107,704	0.3%
Utah County						
Non-Ag. Employment (thous.)	73.3	72.4 fo	-1.2%	71.3	70.2	1.6%
Unemployment Rate	6.7	7.2	7.5%	6.1	6.6	-8.1%
Auth. Permit Construction (thous. of dol.)	9,042.9	7,208.3	-20.3%	8,708.8	11,046.5	-21.2%
New Dwelling Units (no.)	67	45	-32.8%	100	85	17.4%
Postal Receipts (thous. of dol.)	1,081.2	1,199.2	10.9%	925.8	888.9	4.1%
Electric Customers (Residential)	49,189	50,114	1.9%	49,765	NA	NA
Electric Customers (Commercial)	5,877	6,298	7.2%	6,126	NA	NA
Natural Gas Customers (Residential)	59,590	60,747	1.9%	59,689	58,605	1.8%
Natural Gas Customers (Industrial)	70	70	0.0%	71	69	2.8%
Telephone Lines in Service (Mt. Bell)(Residential)	62,868	64,171	2.1%	62,340	61,204	1.9%
Telephone Lines in Service (Mt. Bell)(Nonresidential)	15,401	16,216	5.3%	15,889	14,806	7.3%
Weber County						
Non-Ag. Employment (thous.)	58.4	60.1 fo	2.9%	59.3	57.3	3.6%
Unemployment Rate	5.6	6.8	21.4%	5.7	5.9	-3.3%
Auth. Permit Construction (thous. of dol.)	2,843.0	5,900.6	100.5%	9,324.3	8,255.8	12.9%
New Dwelling Units (no.)	50	50	0.0%	81	88	-8.3%
Postal Receipts (thous. of dol.)	817.4	832.6	1.9%	620	559	10.9%
Electric Customers (Residential)	51,422	52,585	2.3%	51,828	50,679	2.3%
Electric Customers (Commercial)	4,684	4,776	2.0%	4,744	4,629	2.5%
Natural Gas Customers (Residential)	47,889	48,901	2.1%	48,019	47,016	2.1%
Natural Gas Customers (Industrial)	87	83	-4.6%	86	81	5.1%
Telephone Lines in Service (Mt. Bell)(Residential)	45,319	45,680	0.8%	45,399	45,006	0.9%
Telephone Lines in Service (Mt. Bell)(Nonresidential)	10,610	10,492	-1.1%	10,553	10,384	1.6%

r Revised fo Forecast na - Not available

Sources:

Personal Income:	Bureau of Economic Analysis, U.S. Department of Commerce
New Corporations:	Utah Secretary of State
New Car and Truck Sales:	Utah State Tax Commission, Economic and Statistical Unit
Agriculture:	U.S. Department of Agriculture, Agriculture, Utah: Utah Crop and Livestock Reporting Service
Construction Data:	F.W. Dodge Statistics and Utah Construction Report, Bureau of Economic and Business Research
Employment Data:	Utah Department of Employment Security
Savings Information:	Utah Savings and Loan Institutions
Tax Collections:	Utah State Tax Commission
Net Electric Power Utilized:	Cooperating Utah power companies
Crude Oil Production:	Area oil refineries
Natural Gas Production:	Utah Department of Oil, Gas, and Mining
Coal Production:	U.S. Department of Energy
Air Passengers:	Salt Lake City International Airport, Statistics Division
Highway Traffic Count:	Utah Department of Transportation
Visits to State and National Parks and Monuments:	U. S. Forest Service, Utah State Parks and Recreation Department
Utilities Data:	Cooperating Utah utility companies
Postal Receipts:	Postmasters in Davis, Salt Lake, Utah, and Weber Counties

Footnotes:

1 Obtained from F.W. Dodge Statistics
2 Obtained from Utah Construction Report
3 Includes services by nonprofit and religious institutions
4 Includes public schools and college institutions
5 Contract construction data are no longer available

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NATIONAL DATA

			Year Ago	12 Month Average This Year	12 Month Average Last Year	12 Month Average % Change
U.S. Gross National Product (seasonally adjusted) (bil.) (qtly.)	4,061.5	4,240.6	4.4%	4,206.5	3,969.1	5.6%
Total Personal Income (seasonally adjusted) (bil. of dol.)	3,384.3	3,546.8	4.8%	3,466.1	3,293.5	5.8%
Industrial Production Indexes (seasonally adjusted) (1977=100)	126.3	126.4	0.1%	125.1	124.5	0.5%
Total Non-Farm Bus. Expend. on New Plants & Equip. (bil.) (qtly.)	380.0	344.8[A]	1.4%	380.7	384.4	-1.0%
Index of Leading Indicators (1967=100)	174.1	185.6[P]	6.6%	178.2	168.6	5.7%
Price Indexes						
Consumer Price Indexes (not seasonally adjusted) (1967=100)						
CPI-U (All Urban Consumers) All Items	327.4	331.1	1.1%	326.4	322.2	1.9%
CPI-U (All Urban Consumers) Food & Beverages	305.6	317.0	3.7%	319.3	302.0	5.7%
CPI-U (All Urban Consumers) Housing	355.8	362.1	1.8%	360.2	349.9	2.9%
CPI-U (All Urban Consumers) Transportation	324.0	304.8	-5.9%	310.3	319.9	-3.0%
CPI-U (All Urban Consumers) Medical Care	414.7	446.8	7.7%	433.5	403.1	7.5%
CPI-U (All Urban Consumers) Energy	426.5	342.4	-19.7%	370.3	426.5	-13.2%
Producer Price Index (not seasonally adjusted) (1967=100)						
Producer Price Index, All Finished Goods	297.2	289.9	-2.5%	289.7	293.8	-1.4%
GNP Price Deflator (1982=100) (qtly.)	113.0	115.2	1.9%	114.4	111.7	2.4%
Civilian Employment (seasonally adjusted)						
Total Civilian Labor Force (mil.)	115.2	118.5	2.9%	117.8	115.5	2.0%
Total Civilian Employment (mil.)	108.2	110.6	2.2%	109.6	107.2	2.3%
Unemployment Rate	6.9	6.7[P]	-2.9%	7.0	7.2	-2.6%
Construction						
Total Construction (mil. of dol.)	15,166.0	17,162.6	13.2%	19,120.2	18,631.6	2.6%
Residential	6,976.2	8,034.0	15.2%	8,523.4	8,674.4	-1.8%
Nonresidential	5,308.2	5,584.0	5.2%	6,263.0	6,579.9	-4.8%
Non-Building	2,881.6	3,544.6	23.0%	3,333.9	3,377.4	-1.3%
New Dwelling Units (no.)	115,465	106,448	-7.8%	138,542	142,219	-2.6%
Interest Rates						
Short Term (3-month Treasury bill rate)	7.07	5.49	-22.3%	5.97	7.49	-20.3%
Long Term (30-year Treasury bond yields)	9.60	7.67	-20.1%	8.14	10.75	-24.3%
Prime Rates Charged by Banks on Short-term Business Loans (ave.)	9.50	7.50	-21.1%	8.33	9.93	-16.1%
Mortgage Rates (new homes)	10.39	9.28	-10.7%	9.82	11.11	-11.6%

[A] Anticipated [P] Preliminary

Sources: Business Conditions Digest, U.S. Department of Commerce: U.S. Gross National Product, Total National Personal Income, Industrial Production Indexes, Total Business Expenditures for New Plant and Equipment, Index of Leading Indicators, GNP Price Deflator, National Employment Data, Interest Rates.

F.W. Dodge Report, McGraw-Hill: National Construction Data.

Survey of Current Business, U.S. Department of Commerce: New Home Mortgage Rates.

Utah Labor Market Report, Utah Department of Employment Security: Consumer Price Indexes, Producer Price Indexes.

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